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PHILIPS

# P817 USER MANUAL



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## Preface

This manual describes the user oriented aspects of the Philips P817 Video Display Terminal.

Part 1 contains a functional description of the P817, and technical data.

Part 2 describes general operational features, keyboards, keyboard functions, and software function commands.

Part 3 describes the line interface ( standard V24 interface, and optional current loop interface and modem interface), and the auxiliary interface.

Part 4 contains installation requirements and procedures, and user's maintenance procedures.

The Appendices contain ASCII and ISO code tables.

Great care has been taken to ensure that the information contained in this manual is accurate and complete. Should a user, however, find any errors or omissions, or wish to suggest improvements, he is invited to write his comments on the comment sheet provided at the end of this manual and send it to:

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The P817 video display terminals are table top terminals, consisting of a display unit and a separate keyboard.

Two types are available: The P817-001, which is TTY compatible, operates in character mode, and has a 64 character set (96 character on option), and the P817-002, which can operate in character mode or block mode, has a 96 character set, and offers extra features such as editing (insert/delete line or character), tabulation, and split screen operation. Both types have a 12-inch screen, providing 24 lines of 80 characters, a serial V24 interface, and self-contained power supply.

Figure 1 shows a P817-002 terminal, with the display unit on the optional swivel stand.

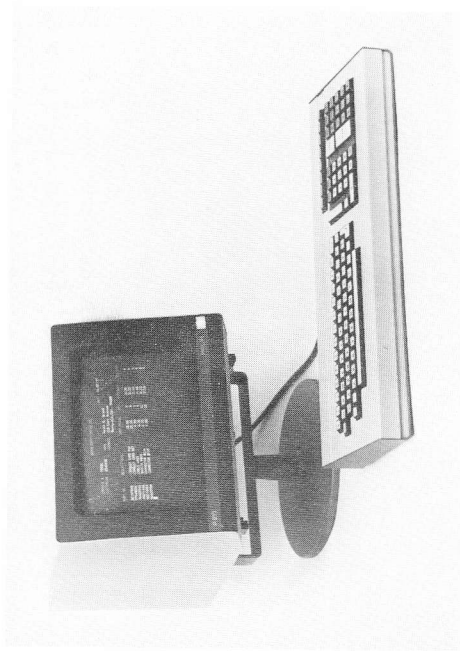


FIG. 1 P817-002

By means of hardware straps, the user can select several operational features of the P817: for both models the transmission rate (in the range 50 - 9600 bits/sec); parity (odd, even, fixed "0", fixed "1", or no parity); one or two stop bits, and the roll up function; for

the P817-001 echoplex or direct operation, and for the P817-002 echoplex or direct operation in character mode, and half/full duplex operation in block mode. Some strap-selectable functions can be changed from the keyboard, in strap selection mode (P817-001 and P817-002), or via the software (P817-002 with split screen option only).

Three keyboards are available: a TTY style keyboard (upper case only) for the standard P817-001, a typewriter-style keyboard with upper and lower case characters and a numeric pad for the P817-001 with the 96 character set, and an extended typewriter-style keyboard with numeric pad and function keys for the P817-002.

The P817-002 can be extended with options to provide a 96 character set blinking, blanking and underlining facility, and hard copy facility via an auxiliary device. For the P817-002 options are available for underlining, blinking and blanking, hard copy via an auxiliary device, and split screen operation. For both types, an optional plug-in current loop interface and an optional plug-in in-plant modem are available, and both types can be equipped with an optional swivel stand for the display unit.

## PART I

# PRODUCT DESCRIPTION

The P817 display terminal consists of a display unit and a separate keyboard. The display unit contains the cathode ray tube, video and control electronics, and the power supply; the keyboard unit contains the actual keyboard, and associated electronics.

#### DISPLAY UNIT

The display unit contains the modules shown schematically in Figure 2. Not shown is the power supply card, which provides the d.c. voltages for the display unit and the keyboard.

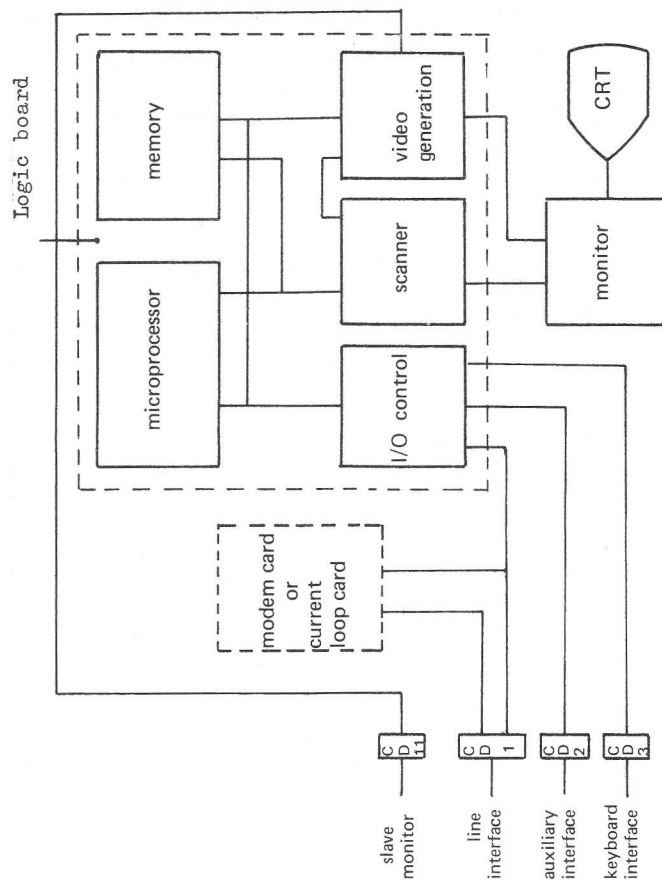


FIG. 2. DISPLAY UNIT MODULES



### I/O Control Module

The I/O control module controls data transmissions over the line interface, the auxiliary interface, and the keyboard interface, and handles the serial to parallel conversion of incoming data, and the parallel to serial conversion of outgoing data.

### Microprocessor

The microprocessor interpretes and executes the microprogram stored in the program memory. It consists of a central processing element, which controls I/O operations via the I/O control module, and controls the actual display process via the scanner and video generation module, and a direct memory access element, which controls data transfers to and from memory.

### Memory

The memory consists of four main parts: the program memory, the image memory, the attributes memory, and the options memory.

The program memory is a read only memory, containing the micro-program used by the microprocessor to control terminal operation (e.g. to scan the line and keyboard interfaces for data, to send data characters to the image memory, and to decode control characters and execute the associated microprogram control routine).

The image memory is a random access memory, containing the data to be displayed on the screen. Each character occupies 8 bits in the image memory: 7 bits for the character represented in ISO-code, and 1 bit to indicate normal or low intensity (combined with write-protection in P817-002 terminals).

The attribute memory is a random access memory, in which, for each character position of the screen, 3 bits indicate the display attributes (blinking, blanking, underlining) and 1 bit indicates whether the cursor is in that character position.

The options memory consists of hardware straps, used to select optional features and functions (e.g. transmission rate and parity line and auxiliary interfaces, national versions of character set, etc.).

### Scanner

The scanner module controls the generation and timing of the character images on the screen.

The screen image consists of 24 lines of 80 character positions, and each character is displayed in a character window consisting of 9 x 15 dot positions, as shown in Figure 3.

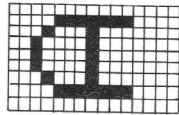


FIG. 3. CHARACTER WINDOW

The scanner contains 4 counters, which control the generation of characters within the character windows: the dot counter counts the dot positions in a character window horizontally, the character counter counts the character windows horizontally, the line counter counts the dot positions in a character window vertically, and the row counter counts the character windows vertically.

### Video Generation Module

The video generation module converts the parallel character codes read from memory into serial data for display on the screen.

A complete line of 80 characters is read into a row memory, together with the attributes for each character. A character generator reads only memory, addressed by the character codes, generates video data in 15 steps, corresponding to the 15 horizontal dot lines in a character window. The video data are serialized and mixed with the attribute codes to form the video signals for a character line.

A composite video signal, consisting of the video data and horizontal and vertical synchronization signals, is created by the video generation module for displaying data on a remote slave monitor.

### Monitor

The monitor converts video signals into character images. The monitor electronics consist of three main parts: a video amplifier, horizontal deflection electronics, and vertical deflection electronics. Characters are formed from dots, produced on the screen by modulating the intensity of an electron beam with the serial video data, and by deflecting the electron beam, line by line, along the dot positions in the character windows.

### KEYBOARD

The keyboard unit contains 3 main functional parts: the key matrix, the key encoder, and I/O control (Figure 4). The unit is connected to the display unit by a single cable for data interface and power supply.

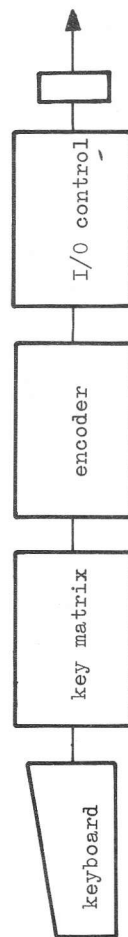


FIG. 4. KEYBOARD ELECTRONICS

The key switches, except for the Shift and CNTRL keys, are arranged in a matrix consisting of X and Y lines; each key is associated with an unique set of X/Y coordinates. The key encoder converts the X and Y signals, together with the state of the Shift and CNTRL keys, into the corresponding data character or control character code. The I/O electronics control the transmission of data between the display unit and the keyboard.

### POWER SUPPLY

The switched mode power supply is contained on a separate card, located in the display unit. It converts the mains supply into isolated and regulated d.c. voltages (+5V, +12V, +70V) required by the display unit and keyboard electronics. Because of the high switching frequency (50kHz), the supply unit has a low power dissipation, and does not require forced air cooling.

### Screen

capacity - 24 lines of 80 characters  
size - 220 x 145 mm screen image  
- 12 inch (diagonal) CRT  
type - P4 (white) phosphor screen  
- non-glare surface

characters - 7x9 dot matrix for upper case characters  
- 7x12 dot matrix for lower case characters  
- 2.1 x 3.5 mm character size  
- dot pitch 0.3 mm  
- 9x15 dot matrix cursor, current character shown in inverse video  
- refresh rate 50 Hz

### Keyboards

keyboard 051 - TTY style keyboard  
- alphanumeric keys (upper case only)

- control keys  
- type-a-matic function  
- n-key roll-over function

keyboard 052 - typewriter style keyboard  
- alphanumeric keys (upper and lower case)  
- numeric pad  
- control keys

- type-a-matic function  
- n-key roll-over function  
keyboard 053 - typewriter style keyboard

- alphanumeric keys (upper and lower case)  
- numeric pad  
- control keys  
- function keys and indicators  
- type-a-matic function  
- n-key roll-over function

## Interfaces

- Line interface
  - V24 serial interface
  - optional in-plant modem ( option P817-110)
  - optional current loop interface( option P817-100)
- aux. interface
  - V24 serial interface
- transmission rate - 50 to 9600 bits/sec
- character format
  - 1 start bit
  - 1 data character (7-bits ISO-code)
  - 1 parity bit
  - 1 or 2 stop bits

## Features & Functions

- P817-001
  - character mode
  - echoplex or direct operation
  - full duplex
  - roll up
  - strap selection from keyboard
  - low intensity
  - cursor addressing/sensing
  - blinking, blanking and underlining (option P817-015)
  - hard copy device connection (option P817-015)
  - slave monitor connection
- P817-002
  - 64 character set (96 with keyboard P817-052)
  - character/block mode
  - echoplex/direct operation in character mode
  - half/full duplex operation in block mode
  - roll up
  - 96 character set
  - strap selection from keyboard
  - editing functions (insert/delete line/character)
  - protected fields (combined with low intensity)
  - tabulation
  - cursor addressing/sensing
  - hard copy device connection (option P817-025)

- slave monitor connection
- blinking, blanking and underlining (option P817-025)
- split screen operation (option P817-026)

## Strap Selectable Functions

- P817-001/002
  - transmission rate terminal
  - transmission rate hard copy device
  - echoplex/direct operation
  - parity terminal
  - parity hard copy device
  - delay time for hard copy device
  - upper case conversion for hard copy device
  - attribute options enabled
  - national versions character set
  - number of stop bits
  - auxiliary interface enabled/inhibited
- P817-001 only- roll up
- P817-002 only- character/block mode
  - half/full duplex operation
  - split screen size
  - roll up screen parts or complete screen
  - inhibit insert/delete line function

## Strap Selection from Keyboard

- P817-001
  - transmission rate
  - parity
  - number of stop bits
  - roll up
- P817-002
  - echoplex/direct operation
  - character/block mode
  - half/full duplex
  - split screen size
  - roll up for screen parts
  - transmission rate
  - parity
  - number of stop bits



#### Stap Selection via Software

- P817-002
- character/block mode
  - split screen size
  - roll up screen parts

#### Power Supply

- voltage
- 200-240V  $\pm$  10%
  - 100-130V  $\pm$  10%
- frequency
- 50 Hz  $\pm$  2%
  - 60 Hz  $\pm$  2%
- fuses
- 1A (200-240V)
  - 2A (100-130V)
- cable
- 2.5 m

#### Environmental Conditions

- temperature
- 20°C - +65°C non-operating
  - +5°C - +40°C operating
  - max. rate of change 10 C/30 min
- rel. humidity- 10-90% (non-condensing)
- altitude
- max. 3048 m (10,000')

#### Dimensions

- monitor
- 336 x 282 x 417.5 mm (width x height x depth)
- monitor+stand-
- 336 x 418 x 417.5 mm (width x height x depth)
- keyboard
- 540 x 70 x 195 mm (width x height x depth)

#### Weight

- monitor
- 17 kg (with swing wire stand)
- keyboard
- 24 kg (with swivel stand)
  - 5 kg

## PART II

## OPERATION

The three main functions of the P817 display terminal are to display data entered from the keyboard on the screen, to transmit these data to the system, and to display data sent from the system to the terminal.

#### Keyboard Input

In OFF LINE mode, the data entered on the keyboard are displayed on the screen, but not sent to the system, and input from the system is not accepted. In ON LINE mode, data entered on the keyboard are displayed on the screen and sent to the system, either character by character (P817-002 operating in character mode), or as blocks consisting of one or more lines (P817-002 in block mode).

If the terminal is operating in character mode, data are either displayed on the screen and sent to the system simultaneously (direct mode), or sent to the system and 'echoed' back to the screen (echoplex mode). Data characters entered on the keyboard are displayed on the screen at the character position indicated by the cursor, which is displayed as a white square. After each keyed-in character, the cursor is moved one position forward; by means of control keys on the keyboard, the cursor can be moved to other positions on the screen (e.g. Cursor Home, Cursor Down, etc.). If the terminal operates in character mode, each character is transmitted to the system when it is entered on the keyboard; if the terminal operates in block mode, the line or lines up to the current cursor position are transmitted when the **RTB** key is pressed.

#### System Input

Data sent from the system may be characters to be displayed on the screen, or command codes to control the operation of the terminal. Characters are displayed with or without format attributes. The format attributes are: blinking (characters displayed/not displayed at a rate of 1.5 Hz), blanking (characters are replaced by a blank on the screen, e.g. passwords) underlining (a continuous line underneath the

characters) and low intensity (characters displayed at 2/3 of the normal intensity, in P817-002 terminals also protected against overwriting). Format attributes are set and reset by means of software command codes.

#### Controls and Indicators

The P817-001 and P817-002 have the following common controls:

Power on/off a combined push button and indicator light in the lower right hand corner on the front side of the display unit. When power has been switched on, the indicator (white) is lit.

ON LINE/OFF LINE a switch at the back of the display unit. When switched to 'OFF LINE', only the characters entered from the keyboard are displayed on the screen

Brightness a thumbwheel on the lower front side of the display unit, used to vary the brightness of the screen image.

#### Strap Selectable Functions

Several application-dependent operational features of the P817 display terminals can be selected by hardware straps on the logic board inside the display unit. These features include:

- for P817-001/002: transmission rate terminal
  - transmission rate hard copy device
  - echoplex/direct operation (P817-001, and P817-002 in character mode)
  - parity terminal (odd, even, fixed '0' or '1', or no parity)
  - parity hard copy device (odd, even, fixed '0' or '1', or no parity)
  - delay time for hard copy device
  - upper case conversion for hard copy device
  - attribute options enabled
  - hard copy device interface enabled

national versions character set  
number of stop bits

- for P817-002: half/full duplex operation (in block mode)
  - split screen size
  - roll up function for split screen (parts)
  - character/block mode
  - inhibit 'insert/delete line' function

The strap selectable functions can be changed from the keyboard in 'strap selection mode'. In P817-002 terminals, the straps set for character or block mode, for screen part size and for the roll up functions for the two screen parts can be changed via the software (see chapter 'Software Commands').

The strap selection mode is entered by pressing the Backspace key together with the CRTL key. The screen will be cleared, and 'XXXXXXXXXX' is displayed on the top line of the screen to indicate that the terminal is in strap selection mode, and the cursor is placed in the first character position on the second line. The functions selected by straps are changed by typing in commands, each starting at the first character position of a new line. If two different commands are entered for the same function, only the last command is effective. The strap selection mode is left by typing in a period (.) on a new line. If all commands were correct, the screen is cleared to indicate that the commands have been executed, and the normal operational mode is entered. In case of errors, the screen is not cleared, the erroneous lines are marked with 'XXX' after the last character in the line, and the period is removed to indicate that the terminal is still in the strap selection mode. The operator can enter the correct commands, and leave the strap selection mode as described above.

The keyboard commands to change the strap-selected functions are:  
TR x transmission rate 'x' bits/sec, 'x' must be one of the values 50, 75, 110, 134, 5, 150, 200, 300, 600, 1200, 1800, 2400, 4800 or 9600.



Po parity fixed '0'

Pl parity fixed '1'

P0 odd parity

PE even parity

PN no parity

RU roll up function available

RN roll up function not available

SB 1 1 stop bit

SB 2 2 stop bits

EP echoplex operation (all characters entered from the keyboard are sent to the CPU first, and then echoed back to the screen)

EN direct operation (all characters entered from the keyboard are sent to the CPU and the screen directly)

DH half duplex (P817-002 only)

DF full duplex (P817-002 only)

MC character mode (P817-002 only)

MB block mode (P817-002 only)

The commands EP/EN cannot be used for P817-002 terminals operating in block mode.

Note: When the terminal is switched off and switched on again, the functions selected previously from the keyboard are discarded, and the function selection by hardware straps is valid again.

#### Split Screen

In P817-002 terminals with the split screen option, the screen area can be divided into two independent parts. The number of lines for the upper screen part can be selected by hardware straps in the range 0 (no split screen) to 23 lines. All keyboard functions apply only to the screen part in which the cursor is present, or to the whole screen if the option is not present or the split screen feature has not been selected. All software commands defined for a complete screen apply to a screen part if split screen has been selected. Software commands not specifying an explicit line number

apply to the screen part in which the cursor is present; software commands specifying an explicit line number apply to that line, independent of the split screen.

The following commands can be used in 'strap selection mode' to change the split screen functions:

SS x x lines in upper screen part ( $0 \leq x \leq 23$ )

RUy roll up function available for upper screen part

RUN roll up function not available for upper screen part

RLY roll up function available for lower screen part

RLN roll up function not available for lower screen part

#### Protected fields

In P817-002 terminals any number of characters on the screen can be specified via the software as 'protected fields'. These characters, which are displayed at about  $2/3$  of normal intensity, are protected against overwriting from the keyboard, and are not transmitted after a transit command. Cursor control keys can bring the cursor into protected fields, but even then it is not possible to change the contents of those fields.

#### Hard Copy Device

If a hard copy device is connected to the display terminal, one or more lines from the screen can be printed. A hard copy is requested by a command from the keyboard (PRINT key) or by a software command (MC - Media Copy) from the system. The user can request a copy of the line in which the cursor is present, up to the current cursor position, or a copy of the complete screen image from the first character position on the first line, up to the current cursor position.

By means of straps on the logic board in the display unit, the user can select the transmission rate to the hard copy device (50 - 9600 bits/second), conversion to upper case characters, a delay time to adapt the data transmission from the terminal to the printing speed of the hard copy device, and the type of parity for data sent to the hard copy device.

The three types of keyboards available for the P817 terminal are:

- keyboard P817-051: a 64 character TTY style keyboard, with an alphanumeric part (upper case characters only), 4 function keys, and 2 indicators
- keyboard P817-052: a 96 character typewriter style keyboard, with an alphanumeric part (upper and lower case), a CAPS LOCK key (with indicator) which converts the keyboard to a TTY style keyboard, a numeric pad, 4 function keys and 2 indicators
- keyboard P817-053: a 96 character typewriter style keyboard, with an alphanumeric part (upper and lower case) which can be converted to a TTY style keyboard by means of a CAPS LOCK key (with indicator), a numeric pad, 20 function keys and 8 indicators.

All three keyboards have n-key roll-over function (i.e. all keys pressed at the same time are scanned and actioned sequentially), and all keys have 'type-a-matic' function: the function of any key pressed for more than one second is repeated at a rate of ca. 12 times a second.

All three keyboards have a SHIFT key, which gives most alphanumeric keys a double function, and a CNTRL key, which gives a second or third function to certain function keys.

Note: the location of some alphanumeric keys is different for national versions of the keyboards; in the illustrations the letter inscriptions on the keys are shown as in the English version, the symbol key inscriptions (which differ for all national versions) are not shown. Currently available are the German, English/Dutch and U.S.A. national versions; other versions are available on request.

#### Keyboard\_P817-051

Keyboard model 051 is shown in Figure 5. Apart from the alphanumeric part, which is identical to a normal typewriter, the keyboard contains the keys and indicators listed below.

# Keyboard P817-052

Keyboard P817-052 is shown in Figure 6. It is a keyboard P817-051, extended with a CAPS LOCK key and indicator, and a numeric pad. The alphanumeric part operates in the same way as a normal typewriter keyboard: upper case characters are generated by pressing the SHIFT key together with the required character key. The CAPS LOCK key converts the keyboard to a keyboard model 051 (64 characters, upper case only), which is indicated by the CAPS indicator. The numeric pad is used to enter the numeric values indicated on the keys.

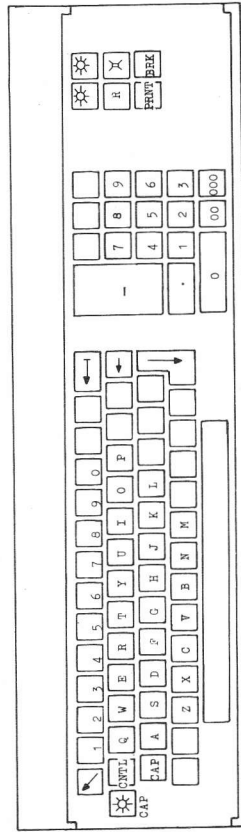


FIG. 6. KEYBOARD P817-052

# Keyboard P817-053

The keyboard P817-053 contains an alphanumeric part and numeric pad identical to the keyboard P817-052 (except for the Cursor Down key, see below), and additional function key and indicators. The keyboard P817-053 is shown in Figure 7.

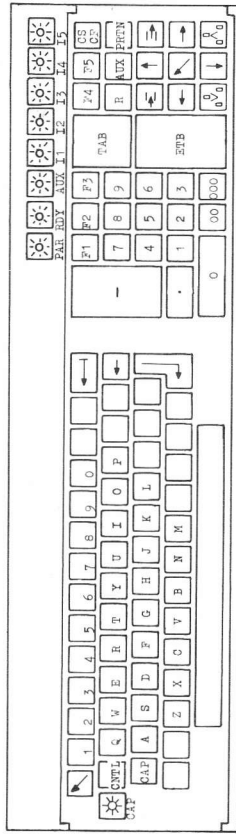


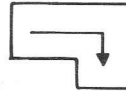
FIG. 7. KEYBOARD P817-053

The keys and indicators on keyboard P817-053 different from the ones on keyboard P817-051 and/or P817-052 are:

## CURSOR RETURN NEXT LINE

Moves the cursor to the first character position on the next line. If the cursor was on the bottom line, nothing happens if the roll up function is not strapped; all lines move up one position if the roll up function is strapped.

In character mode, this key has the function 'CURSOR DOWN', as described for keyboard P817-051.

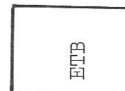


## TRANSMIT LINE (without CNTL)

## TRANSMIT PAGE (with CNTL)

## BREAK (with Shift and CNTL)

If pressed without the CNTL key, all characters from all unprotected fields in the line where the cursor is present are transmitted, up to the current cursor position. The last character of each unprotected field is followed by the





code for HT (/09), the complete line is followed by the code EM (/19).

If the ETB key is pressed together with the CNTL key, all characters from all unprotected fields, from the first character position on the first line, up to the current cursor position, are transmitted. However, if the ETB key is pressed when the cursor is on the last position of a line or an unprotected field, and the character in that position is the last typed-in character, this character is also transmitted. The last character of each unprotected field is followed by the HT (/09) code, each line is followed by the codes for Cursor Return (/OD) and Line Feed (/OA), and the completely transmitted page is followed by the code EM (/19).

If the ETB key is pressed together with the CNTL and Shift key, a break (all zeros) is sent to the CPU during at least 1,5 character time.

CURSOR HORIZONTAL TABULATION (without CNTL)

CURSOR HORIZONTAL BACK TABULATION (with CNTL)

Pressed without the CNTL key, the TAB key moves the cursor to the first character position in the next unprotected field.

Pressed together with the CNTL key, the TAB key moves the cursor to the first character position in the current (unprotected) field. If the cursor already is in the first position of an unprotected field, the cursor is moved to the first position of the previous unprotected field.

CURSOR UP

Moves the cursor to the same character position on the preceding line.

CURSOR DOWN

Moves the cursor to the same character position on the next line.

TAB



CURSOR HOME

Moves the cursor to the first character position on the first line.

CURSOR LEFT

Moves the cursor one character position to the left on the same line, or to the last character position on the previous line if the cursor already was in the first position of a line.

CURSOR RIGHT

Moves the cursor one position to the right on the same line, or to the first position on the next line if the cursor was in the last position of a line. If the cursor was in the last position of the bottom line and the roll up function is strapped a roll up occurs.

INSERT LINE

Inserts a blank line at the current cursor position. The current line and all following lines move one line down, and the last line is lost.

If the roll up function is not strapped, the Insert Line function can be inhibited by means of a strap.

DELETE LINE

Deletes the current line. All following lines move one line up. If the roll up function is not strapped, the

Delete Line function can be inhibited by means of a strap.

INSERT CHARACTER

Inserts a space-character at the current cursor position. All characters to the right of the cursor move one position to the right. Characters shifted over the end of the line or into protected fields are lost.

## DELETE CHARACTER

Deletes the character at the current cursor position.

All characters to the right of the cursor up to the end of the line or the end of the unprotected field are shifted one position to the left, and a null-character is added in the vacated character position.



CLEAR FOREGROUND (without CNTL)

CLEAR SCREEN (with CNTL)

CLEAR FOREGROUND clears all unprotected fields on the screen, from the current cursor position to the end of the screen.

CLEAR SCREEN clears the complete screen image, independent from the split screen function. All attributes are set to the initial state.



## PROGRAM CONTROL KEYS

Each key Fx ( $1 \leq x < 5$ ) transmits a Program Control Key Report to the CPU. The Program Control Key Report has the format CSI-p-/73-EM, in which CSI is the Control Sequence Introducer consisting of the characters /1B and /5B, p is a two-character key code (/30 /3x if key Fx is pressed without the CNTL key, /31 /3x if key Fx is pressed with the CNTL key), and EM (/19) is the code indicating the end of the message.



## FUNCTION indicators II-15

The function indicators II-15 can be lit by software commands from the CPU, see chapter 'Software Commands'.

AUX ON/OFF



Will be used in future extensions.



Software commands are sent from the CPU to the terminal, to control the operation of the terminal or to display data on the screen, or from the terminal to the CPU to report the device status.

Software commands may consist of a single code (e.g. for alphanumeric characters to be displayed on the screen, or /OB for Cursor Home), a single code preceded by the ESC (/1B) code (e.g. /1B /62, for Enable Manual Input), a control sequence consisting of a Control Sequence Introducer (CSI) code (ESC-/5B), parameters, and a final code (e.g. CSI-p-/43, for Cursor Forward p Positions), or a Device Control String, which consists of a Device Control String Sequence Introducer (DSC, code ESC-/50), parameters, and a Sequence Terminator (ST, code ESC-/5C).

The software commands are coded according to ISO/DIS 6429 (ECMA 48 and ANSI BSR X 3.64 standards)

Each parameter in a control sequence or a device control string consists of at most two decimal digits, represented by their hexadecimal value in ASCII-code. Non-significant zeros may be omitted, e.g. a parameter with the value 9 may be coded as /30-/39 or as /39. In some commands, one or more parameters may be omitted, in which case a default value is used for the omitted parameter(s). If a command contains more than one parameter, the parameters must be separated by ; (code /3B).

Example: The command Cursor Position, CSI-n-p-/48, which positions the cursor at the n-th position of the p-th line, with parameter values n=64 and p=9, can be coded as

/1B-/5B-/36-/34-/3B-/30-/39-/48  
 ESC     6     4     ;     0     9  
          CSI     64     9

or as

/1B-/5B-/36-/34-/3B-/39-/48

## Common Software Commands

The software commands described below are common for the terminals P817-001 and P817-002.

mnemonic function, code and meaning

BELL BELL code /07

The buzzer in the display unit sounds for 0.1 seconds

BS BACKSPACE code /08

The cursor is moved one position to the left. If the cursor already is on the first character position of the first line, nothing happens; if the cursor was at the first position of any other line, it is moved to last position on the previous line.

LF LINE FEED code /0A

The cursor is moved to the same character position on the next line. If the cursor already is on the bottom line and the roll up function is not wired, nothing happens. If the roll up function is available, all lines move one position up, and the bottom line is filled with null-characters.

VT CURSOR HOME code /0B

The cursor is moved to the first character position on the top line.

FF CLEAR SCREEN code /0C

The screen image is cleared, and the cursor is moved to the cursor home position. The keyboard becomes unlocked (see command EMI below). If CLEAR SCREEN is given in the strap selection mode, the identification ~~#####~~ will stay on the first line, and the cursor will be placed in the first character position on the second line.

CH

CURSOR RETURN code /0D

The cursor is moved to the first character position of the current line.

DMI

DISABLE MANUAL INPUT code ESC-/60

The keyboard is locked, and all keyboard input is ignored (except for the Clear Screen Key). If a key is pressed, the buzzer sounds for 0.1 second.

EMI

ENABLE MANUAL INPUT code ESC-/62

The keyboard is unlocked, and the Disable Manual Input state is reset.

MC(0)

MEDIA COPY (PAGE) code CSI-/30-/69

The contents of the screen, from the first character on the top line up to and including the current cursor position, are copied on the auxiliary device. At the beginning of each line 'Carriage Return/Line Feed' is generated for the auxiliary device.

MC(6)

MEDIA COPY (LINE) code CSI-/36-/69

The line on which the cursor is present is copied on the auxiliary device, from the first character position of the line up to and including the current cursor position. At the beginning of each line 'Carriage Return/Line Feed' is generated for the auxiliary device.

DSR(0)

DEVICE STATUS REPORT (0) code CSI-/30-/6E-/19

The Device Status Report with parameter value 0 is sent from the terminal to the CPU, to indicate that a Media Copy command has been executed properly, and that the copy is ready.

DSR(3)

DEVICE STATUS REPORT (3) code CSI-/33-/6E-/19

The Device Status Report with parameter value 3 is sent

from the terminal to the CPU, to indicate that the copying operation requested by a Media Copy command has not been executed properly (e.g. because device was not operable). To retry, a new Media Copy command must be issued.

CUP CURSOR POSITION code CSI-P-/3B-n-/48

The cursor is moved to the p-th character position on the n-th line. If p or n exceeds its maximum value (i.e. p>80 or n>24), it is assumed to be 0.

DSR(6) DEVICE STATUS REPORT (6) code CSI-/36-/6E

The terminal is requested to send it's actual cursor position in a cursor position report (see below).

CPR CURSOR POSITION REPORT code CSI-P-/3B-n-/52-/19

The Cursor Position Report sent to the CPU reports that the cursor is in the p-th character position on the n-th line. The report is sent 2 msec after a DSR(6) command is issued.

SAT SET ATTRIBUTES code DCS-/30-/XX-ST

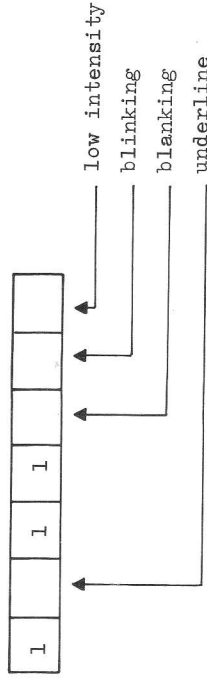
The SAT command sets the format attributes, which control the way in which data are displayed on the screen. The format attributes are:

- underline - a continuous line under all characters
- blinking - characters displayed/not displayed at a rate of ca. 1.5 Hz

- low intensity - characters are displayed at about 2/3 of normal intensity (in P817-002 terminals operating in block mode, these characters are also protected against overwriting from the keyboard, and are not transmitted after a transmit command)

- blanking - characters are stored in the screen memory, but not displayed on the screen

The required attributes are specified by /XX as the hexadecimal value of the 7-bit character shown below:



A '0' bit sets the required attribute.

RAT RESET ATTRIBUTES

code DCS-/31-/XX-ST

The RAT command resets the format attributes, specified by '0' in/XX in the same way as described for the SAT command.

Note: all format attributes are reset automatically for null codes resulting from the Clear Screen, Insert Line and Delete Line command or keyboard entry, and for the line filled with null codes, which appears on the screen after a roll up.

# Software Commands for P817-002

The following software commands are available only for P817-002 terminals:

CHT CURSOR HORIZONTAL TABULATION code CSI-p-/49

The cursor is moved to the first character position of the p-th following unprotected field (default value if p is not specified: p=1), or to the last character position on the bottom line, whichever comes first. If p=0, the command is ignored.

CBT CURSOR HORIZONTAL BACK TABULATION code CSI-p-/6A

If p=1, the cursor is moved to the first position of the current unprotected field (or the first position in the preceding unprotected field if it already was in the first position of the current unprotected field). If p>1, the cursor is moved to the first position of the p-th preceding unprotected field (default value: p=1), or to the home position, whichever comes first. If p=0, the command is ignored.

CUF CURSOR FORWARD code CSI-p-/43

The cursor is moved to the p-th next character position, or to the end of the line, whichever comes first. Default value p=1; if p=0 the command is ignored.

CUB CURSOR BACK code CSI-p-/44

The cursor is moved to the p-th preceding character position, or to the first character position of the line, whichever comes first. Default value p=1. If p=0, the command is ignored.

CUT CURSOR UP code CSI-p-/41

The cursor is moved p lines up in the same character position, or to the same character position on the top line,

whichever comes first. Default value p=1. If p=0, the command is ignored.

CUD

CURSOR DOWN

code CSI-p-/42

The cursor is moved p lines down in the same character position.

If the p-th line is beyond the bottom line, the cursor remains on the bottom line; if the roll up function is strapped, roll ups are executed until the p-th line becomes the bottom line. Default value p=1; if p=0 the command is ignored.

IL

INSERT LINE

code CSI-p-/4C

p lines are inserted at the line on which the cursor is present. The contents of the current line and all following lines are shifted p lines down, and the lower p lines are lost. Default value p=1; if p=0 the command is ignored.

DL

DELETE LINE

code CSI-p-/4D

The p lines from the current cursor position down are deleted; all following lines move p lines up, and p lines with null-characters are added at the bottom of the screen. Default value p=1; if p=0 the command is ignored.

FO

FAST OUTPUT

code CSI-p-/70

The character following this command is repeated p times from the current cursor position, or up to the end of the line, whichever comes first. The cursor remains in it's old position. If the specified character is non-displayable (hexadecimal value </20 or =/7F) p white squares are displayed.

WST

WRITE STRAPS code DCS-/34-x-y-ST

WL WRITE LINE code CSI-p-/3B-n-/3B-x-/71  
The string of x characters following this command is written on line n, starting from character position p.

If the string is longer than the available line length, all remaining characters are written on the last character position of the line.

If x=0, it is assumed to be 1. If one of the parameters p or n is not specified, specified as 0, or too high (p>80 or n>24), it is assumed to be 1. All non-displayable characters in the string are replaced by white squares.

RL

READ LINE code CSI-p-/3B-n-/3B-x-/72

The Read Line command requests the terminal to send a Read Line Report (see below), followed by the string of x characters, starting from the p-th character position on line n, to the CPU.

If the string includes characters in protected fields, these characters are transmitted as well.

If the part of the line between the specified character position and the end of the line is shorter than the specified string, only that part of the line is transmitted. If x=0, it is assumed to be 1. If one of the parameters p or n is not specified, specified as 0, or too high (p > 80 or n > 24), it is assumed to be 1.

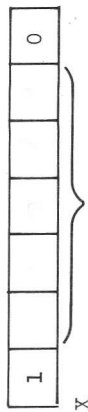
RRL

READ LINE REPORT code ESC-/51

The Read Line Report is sent from the terminal to the CPU 2 msec after a Read Line command is issued. The Read Line Report is followed by the character string specified in the Read Line command; the character string is terminated by /19.

WRITE STRAPS

The WST command is used to change the strap-selectable split screen function. The new function specification is contained in hexadecimal code in the characters x and y, of which the 7-bit binary value is shown below:



binary number of lines in upper screen part (0 if no split screen, maximum value: 23)



Y (1-character mode, 0=block mode)  
roll up for lower screen part  
roll up for upper screen part  
(1 = roll up, 0 = no roll up)

If X or Y is specified with an illegal value, the command is ignored.

RST

READ STRAPS code DCS-/35-ST

The terminal is requested by CPU to send a Read Straps Report (see below).

RSR

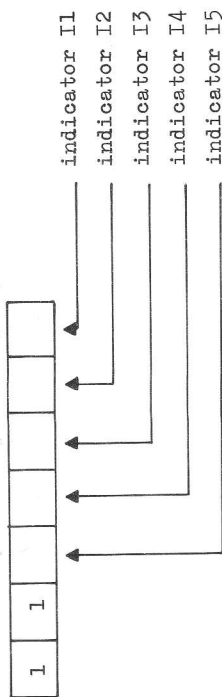
READ STRAPS REPORT code DCS-/36-x-y-ST-/19

The Read Straps Report sent to the CPU after a RST command contains the current value of the straps for the split screen and the roll up function for the screen parts and the transfer mode, in the format described for the WST command. This report is sent 2 msec after a RST command is issued.



SIND SET INDICATOR code DCS-/32-x-ST

The indicators specified by x are lit. The binary format of x is



A '0' bit specifies that the indicator must be lit.

RIND RESET INDICATOR code DCS-/33-x-ST

The indicators, specified by a '0' bit in x, in the format described for the SIND command, are extinguished.

ED ERASE IN DISPLAY code CSI-p-/4A

All unprotected characters in the screen area specified by p are replaced by null-characters.

p=0 specifies the screen area from the current cursor position to the end of the screen.

p=1 specifies the screen area from the first character on the top line up to the current cursor position  
p=2 specifies the complete screen.

If p=0 the cursor remains in the current unprotected field, or the cursor is moved out of the current protected field to the first position in the first unprotected field.

If p=1 or p=2 the cursor is moved to the home position. If the home position is in a protected field, the cursor is moved to the first position in the next unprotected field.

## PART III

## INTERFACES

For the P817 display terminal, three types of line interface are available:

- standard V24 interface, conform to CCITT V24/V28 requirements
- current loop interface (optional)
- inplant modem interface (optional)

The optional current loop interface card or inplant modem card is plugged in on the line interface via a connector inside the display unit.

All three interfaces use connector CD1 for connection to the line. This connector is located at the back of the display unit, as shown in Figure 8. The signal-to-pin assignment is shown in Table 1.

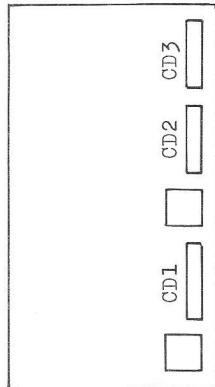


FIG. 8. INTERFACE CONNECTORS.

pin	signal	pin	signal
1	CT101	12	MDINa
2	CT103	13	MDOUTa
3	CT104	14	MDINb
4	CT105	15	CT114
5	CT106	16	MDOUTb
6	CT107	17	CT115
7	CT102	20	CT108.2
8	CT109	23	CT111

TABLE 1. SIGNAL CONNECTIONS CD1

## V24 INTERFACE

The V24 interface allows transmission rates from 50 to 9600 bits/sec, selectable by straps on the logic board inside the display terminal, or from the keyboard in strap selection mode.

Data characters are exchanged asynchronously, in start/stop code, consisting of 1 start bit, 1 data character in 7-bits ISO code, 1 parity bit, and 1 or 2 stop bits. The number of stop bits and the parity (odd, even, fixed '1' or '0', or no parity) can be selected by straps. Terminal control codes are coded according to ISO/DIS 6429 (ECMA 48 and ANSI BSR X 3.64 Standards). The control codes can consist of a single character, or a code string. For details about strap selection and strap positions see P817 Service Manual.

### Interface Signal Levels

Table 2 shows the line interface signal levels, according to CCITT V24 standard.

transmit	control	logic '1' = +12V
		logic '0' = -12V
	data	logic '1' = -12V
		logic '0' = +12V
receive	control	logic '1' $\geq$ +3V
		logic '0' $\leq$ -3V
	data	logic '1' $\leq$ -3V
		logic '0' $\geq$ +3V

TABLE 2. SIGNAL LEVELS V24 INTERFACE

## Interface Circuits and Signals

The V24 interface uses the following circuits and signals

circuit	signal
CTL01	protective ground
CTL02	signal ground (common return)
CTL03	transmitted data
CTL04	received data
CTL05	request to send
CTL06	ready for sending
CTL07	data set ready
CTL08.2	data terminal ready
CTL09	received line signal detector
CTL11	data signalling rate selector
CTL14	transmitter signal element timing
CTL15	receiver signal element timing

### CURRENT LOOP INTERFACE

The current loop interface card converts V24 levels to current loop levels, by means of a receiver and a transmitter. The interface card can be used for two-wire or four-wire connections, both with or without current source(s) for the transmitter and/or receiver. The current sources can be adjusted to 20 mA, 40 mA or 60 mA by means of straps on the interface card.

Figure 9 shows the maximum transmission rates for line lengths up to 1000 meters, under the conditions:

- transmitter/receiver worst case delay times
- 20 mA current sources
- degeneration from TTL input to output max. 40%
- 4-wire connection
- cable with  $C=100 \text{ pF/m}$ ,  $R=50 \Omega/\text{m}$ , for single wire

# In-plant Modem

The in-plant modem is a signal conversion unit, consisting of a transmitter (modulator) and a receiver (demodulator). It provides the signal conversion between the V24 interface of the display terminal and communication lines for modulated data transmission. The modem allows transmission rates up to 9600 bits/sec, on a two-wire or four-wire connection. Figure 10 shows the maximum transfer rates depending on line length, line type, and 2 or 4-wire operation. By means of straps in the modem card, the user can select 2-wire half duplex or 2-wire full duplex operation, 4-wire operation, wire exchange or no wire exchange, and transmission rate limiting to 4800 bits/sec. For details about the strapping, and about the modem card in general, refer to the Modem Service Manual.

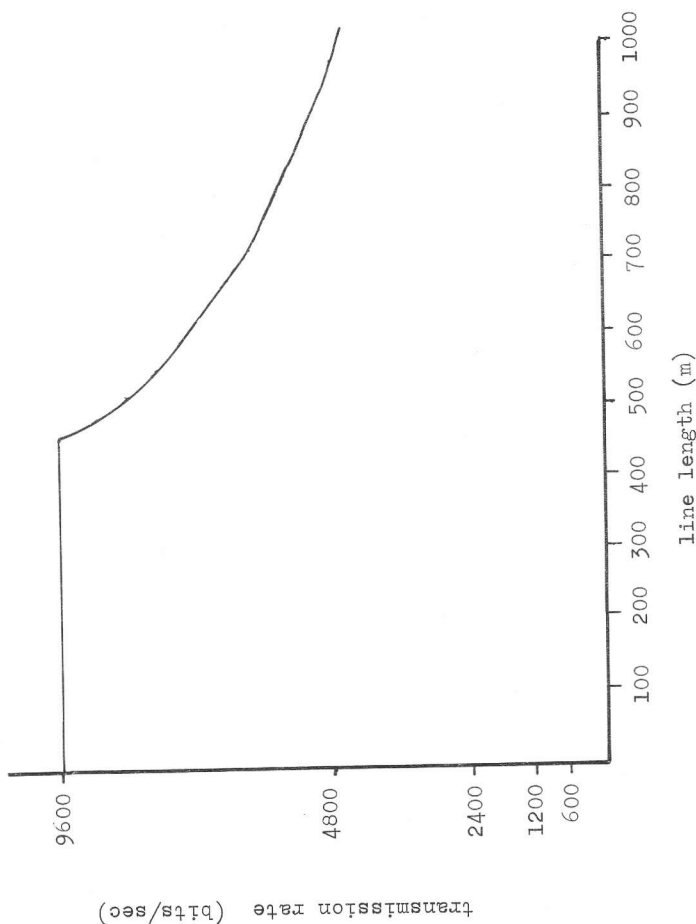


FIG. 9. CURRENT LOOP INTERFACE PERFORMANCE.

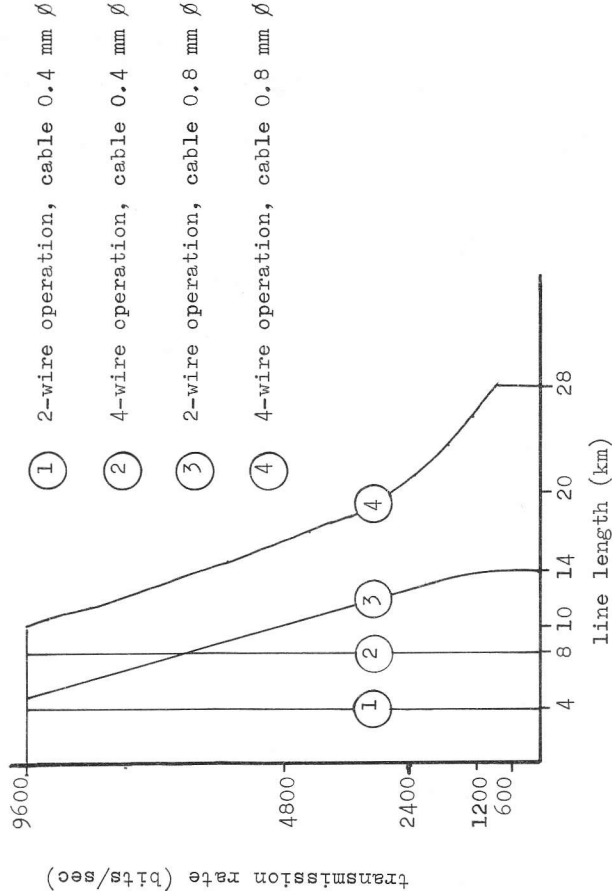


FIG. 10. MODEM PERFORMANCE.

The auxiliary V24 interface provides a connection for a hard copy device, via connector CD2 at the back of the display unit. (see Figure 8).

#### Interface Signals

Table 3 shows the signal names and functions for the auxiliary interface, and the pin numbers for connector CD2

pin	signal	function
1	CTL01A	protective ground
2	CTL03A	transmitted data
3	CTL04A	received data
4	CTL05A	request to send
5	CTL06A	ready for sending
6	CTL07A	data set ready
7	CTL02A	signal ground
20	CTL08.2A	data terminal ready

TABLE 3. INTERFACE SIGNALS CD2

Data characters are transferred to the hard copy device asynchronously, in start/stop code, consisting of 1 start bit, 1 data character (7-bits ISO-code), 1 parity bit, and 1 or 2 stop bits.

#### Strap Selectable Functions

For the hard copy device connected via the auxiliary interface, the following functions can be selected by straps on the logic board in the display unit:

- transmission rate, in the range 50-9600 bits/sec
- parity (odd, even, fixed '1', fixed '0', or no parity)
- delay time in data transfer
- data conversion to upper case characters
- 1 or 2 stop bits in data code

- hard copy device enabled

For details about strap locations and strap coding see P817  
Service Manual.

## PART IV

### INSTALLATION & MAINTENANCE



When installing a P817 display terminal, the user must take into account the environmental conditions, some practical requirements for the location of the display unit and the keyboard, and the actual installation procedure.

#### Environmental Conditions

The P817 display terminal is designed to continue operating, and to be functionally undamaged, within the following limits:

temperature	+ 5° C to + 40° C (full range)
	+15° C to + 28° C (optimum operating range)
dynamic limit	10° C/ 30 min.
rel. humidity	10% to 90% (full range)
	20% to 90% (optimum operating range)
	(non-condensing)

#### Practical Requirements

In most applications, the display unit and keyboard will be placed on a table or desk. The recommended table height is 650-750 mm if the operator is sitting, or 900-1150 mm if the operator is standing. The recommended viewing distance for the display screen is 500 to 700 mm. To adjust the position of the screen to the operator's line of sight, the display unit can be tilted 10° by means of the swing wire stand. If the optional swivel stand is used, the display unit can be tilted from -10° to +30° in the vertical plane.

The P817 display units have a non-glare screen, but direct or reflected light falling on the screen can produce a contrast-reducing veil. It is recommended to put the display unit in a position where no direct light (from windows or artificial light sources) can be reflected from the screen. The wall behind the operator should be dark, and free of reflecting objects; the wall behind the screen should be dark and mat.

If artificial lighting is required, the general illumination level should not exceed 300 lux. If the operator's task includes reading written text and/or writing, local lighting at a level of 500 lux is recommended.

#### Installation Procedure

The installation procedure described below applies to display terminals which have been delivered ready for installation, or have been prepared and checked by a qualified service engineer. The details for these procedures (checks on voltage setting power supply, ground connection, correct positions of printed circuit boards in display unit, installation of options, and setting of hardware straps) can be found in the P817 Service Manual.

For the installation of the display terminal, proceed as follows:

- Step 1 Connect mains cable to the mains connector on the back of the display unit (see Fig. 11), and to the power socket
- Step 2 Connect the keyboard interface cable to connector CD3 (see Fig. 11), and tighten the two jack screws
- Step 3 Switch the terminal on, by pushing the ON/OFF switch on the front panel of the display unit; if the indicator in the switch does not light, check the mains fuse as described in the next chapter
- Step 4 Switch the display unit to OFF LINE; enter some alphanumeric characters and control functions to check the correct operation of the display unit and the keyboard
- Step 5 Connect the line interface cable to connector CD1 (see Fig. 11) and tighten the two jack screw
- Step 6 If required, connect the auxiliary interface cable to connector CD2

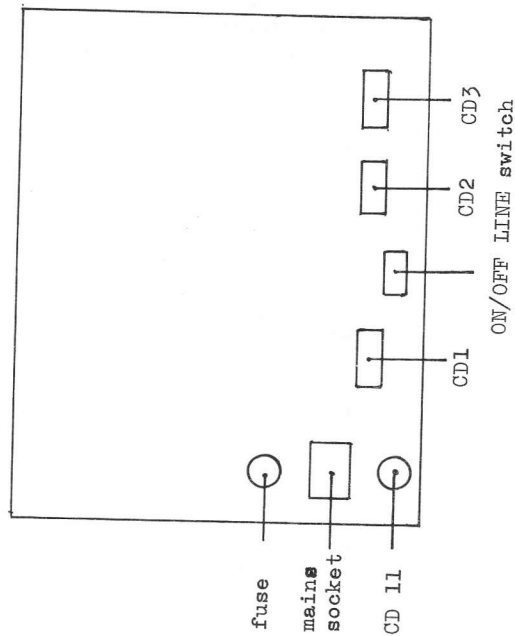


FIG. 11. INTERFACE CONNECTORS

The user's maintenance of the P817 display terminal is restricted to cleaning the display unit and the keyboard, and replacing the mains fuse. All other maintenance should be carried out by a qualified service engineer.

#### Mains Fuse Replacement

If the indicator light in the ON/OFF switch fails to light when the switch is set to ON and the terminal fails to operate, or if the power fails when the terminal is operating, a possible cause may be the failure of the mains fuse. The fuse, which is located at the back of the display unit, should be changed as follows:

- Step 1 Remove the mains plug from the power socket
- Step 2 Set the ON/OFF switch to OFF
- Step 3 Place the head of a screw driver in the slot of the fuse holder, push, and turn anti-clockwise until the fuse holder is released
- Step 4 Replace the fuse with a new one of the correct rating
- Step 5 Replace the fuse holder
- Step 6 Put the mains supply plug in the power socket
- Step 7 Set the ON/OFF switch to ON. If the indicator in the switch lights, operation can be resumed.

Note: If the indicator light in the ON/OFF switch does not light, and the terminal remains inoperable, no further attempts should be made to replace the fuse. The mains power should be disconnected, and further action should only be taken by a service engineer.

#### Cleaning

To clean the display unit and keyboard, wipe or brush all exposed surfaces, paying particular attention to the keyboard key-tops. The display screen should only be cleaned with a Scotch wiper, dampened with isopropyl alcohol.

# Appendix A

Char.	ASCII octal	Intern Hexa
space	240	20
!	241	21
"	242	22
#	243	23
\$	244	24
%	245	25
&	246	26
'	247	27
(	250	28
)	251	29
*	252	2A
+	253	2B
,	254	2C
-	255	2D
.	256	2E
/	257	2F
0	260	30
1	261	31
2	262	32
3	263	33
4	264	34
5	265	35
6	266	36
7	267	37
8	270	38
9	271	39
:	272	3A
;	273	3B
<	274	3C
=	275	3D
>	276	3E
?	277	3F
@	300	40
A	301	41
B	302	42
C	303	43

# ASCII Code

Char.	ASCII octal	Intern Hexa
D	304	44
E	305	45
F	306	46
G	307	47
H	310	48
I	311	49
J	312	4A
K	313	4B
L	314	4C
M	315	4D
N	316	4E
O	317	4F
P	320	50
Q	321	51
R	322	52
S	323	53
T	324	54
U	325	55
V	326	56
W	327	57
X	330	58
Y	331	59
Z	332	5A
[	333	5B
\	334	5C
]	335	5D
↑	336	5E
←	337	5F
Bell	207	07
Linefeed	212	0A
Car. Ret	215	0D

Y \ X	0	1	2	3	4	5	6	7
0	NUL	DLE CA (DC1)	SP	O A2	P A6			
1	SOH	! RC (DC2)	"	1 A	Q	a	q	
2	STX			2 B	R	b	r	
3	ETX	(DC3) A1 FO		3 C	S	c	s	
4	EOT	(DC4) \$		4 D	T	d	t	
5	ENQ	NAK %		5 E	U	e	u	
6	ACK	SYN &		6 F	V	f	v	
7	BEL	ETB !		7 G	W	w		
8	BS (FED)	CAN (		8 H	X	x		
9	HT (FE1)	EM )		9 I	Y	y		
A	LF (FE2)	SUB #		:	J	z		
B	VT (FE3)	ESC +		;	K A3	k	A7	
C	FF (FE4)	IS4 ,		<	L A4	l	A8	
D	CR (FE5)	IS3 -		=	M A5	m	A9	
E	S0	IS2 .		>	N ^	n	A10	
F	SI	US (IS1) /		?	O -	o	DEL	

code format: 

Note: Codes with a value from /20 up to and including /7E result in a character being displayed on the screen; the other codes are function codes.

Where two mnemonics are shown, the one in brackets is the formal one, the other mnemonic is the one commonly used in a TTY environment.

The codes A1 - A10 represent national version dependant characters.

A

ASCII Code . . . . .	55
Attributes . . . . .	13, 30
Attributes Memory . . . . .	4
AUX Key . . . . .	26
Auxiliary Interface . . . . .	45

B

Backspace Key . . . . .	20
Backspace Command . . . . .	28
Bell Command . . . . .	28
Blanking . . . . .	13, 30
Blinking . . . . .	13, 30
Block Mode . . . . .	13, 16
Break Key . . . . .	21, 23

C

CAPS Lock Key . . . . .	22
Character Mode . . . . .	13, 16
Character Window . . . . .	5
Cleaning . . . . .	53
Clear Foreground Key . . . . .	26
Clear Screen Key . . . . .	21, 26
Clear Screen Command . . . . .	28
Controls . . . . .	14
Current Loop Interface . . . . .	41
Cursor Back Command . . . . .	32
Cursor Down Key . . . . .	20, 23, 24
Cursor Down Command . . . . .	33
Cursor Home Key . . . . .	20, 25
Cursor Home Command . . . . .	28
Cursor Horizontal Back Tabulation Key . . . . .	24
Cursor Horizontal Back Tabulation Command . . . . .	32



Cursor Horizontal Tabulation Key . . . . .	24
Cursor Horizontal Tabulation Command . . . . .	32
Cursor Left Key . . . . .	25
Cursor Position Command . . . . .	30
Cursor Position Report . . . . .	30
Cursor Return Key . . . . .	20
Cursor Return Command . . . . .	29
Cursor Return Next Line Key . . . . .	23
Cursor Right Key . . . . .	25
Cursor Up Key . . . . .	24
Cursor Up Command . . . . .	32
 <u>D</u>	
Data Set Ready . . . . .	21
Delete Character Key . . . . .	26
Delete Line Key . . . . .	25
Delete Line Command . . . . .	33
Device Status Report . . . . .	29, 30
Dimensions . . . . .	10
Direct Mode . . . . .	13, 16
Disable Manual Input Command . . . . .	29
Display Unit . . . . .	3
 <u>E</u>	
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## Comment Sheet

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